

# Live-Axis Turning for the Fabrication of Non-Rotationally Symmetric Optics, Phase I

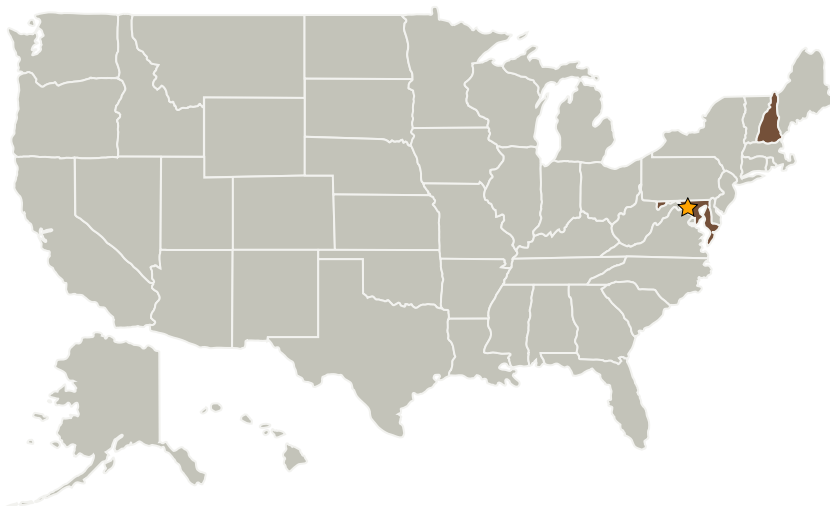
Completed Technology Project (2004 - 2005)



## Project Introduction

The goal of this proposal is to develop a new method to create Non-Rotationally Symmetric (NRS) surfaces that overcomes the limitations of the current techniques and is fast, accurate and inexpensive. Diamond turning (DT) has revolutionized the fabrication of lightweight optical surfaces for defense and science applications such as forward-looking infrared radar and infrared spectrometers. It has made this impact not only because it can accurately and rapidly fabricate diffractive, refractive and reflective optical surfaces, but because it can create reference features tied to the optical surfaces to guarantee optical alignment. An emerging trend in optical design is the use of NRS surfaces that reduce complexity, bulk and weight. To create these surfaces, DT machines have been modified with a low-amplitude Fast Tool Servo, a third axis or a fly-cutter. The problem with the FTS is its limited range and the other techniques are plagued by thermal drift during long fabrication times. The proposed Live Axis Turning (LAT) process combines evolving technologies of air bearings, linear motors, high-resolution encoders and high-speed control systems into a moving lightweight toolpost on a conventional DT machine. The result is a more flexible machine that can increase production and reduce cost for NRS components.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Precitech, Inc.	Supporting Organization	Industry	Keene, New Hampshire

## Primary U.S. Work Locations

Maryland	New Hampshire
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Jeffrey Roblee

## Technology Areas

**Primary:**

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.4 Manufacturing
    - └ TX12.4.3 Electronics and Optics Manufacturing Process